IEEE JOURNAL ON
EMERGING AND SELECTED TOPICS IN CIRCUITS AND SYSTEMS

Call for Papers

Advances in Analog and Mixed-Signal Computing: Architectures, Theory, and Applications

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Scope and purpose

Modern **cyber-physical systems** and **human-centered computing** face rising challenges on traditional hardware due to growing demands for high computing performance and strict **energy efficiency**—especially in resource-constrained environments like **edge computing**, **IoT**, and **wearable devices**. Conventional **digital systems** often fall short, prompting interest in **analog** and **mixed-signal computing** as promising alternatives.

Analog computing, which uses continuous signals, is ideal for processing dynamic data. Advances in **circuit architectures**, **stochastic** (computing), **time-domain**, and **current-mode processing** are enabling high-speed, **energy-efficient operations**. Progress in **co-design methodologies** supports **data pre-processing**, **signal processing**, and **feature extraction**, benefiting from **analog's** inherent parallelism for faster, lower-power computation. Still, **analog** systems face issues with **accuracy**, **reliability**, and **scalability**.

Mixed-signal computing, which combines **analog** and **digital components**, improves computation efficiency by enabling low-power **feature extraction** with **analog** and robust control via **digital circuits**. This balanced design suits **autonomous systems**, **UAVs**, **biomedical implants**, and **edge machine learning**. It also helps overcome the **von Neumann bottleneck** through **non-von Neumann models** like **FPAAs**, **neuromorphic architectures**, **Ising machines**, and **oscillatory networks**.

Emerging technologies like **memristive devices** and **spiking neural networks** strengthen **mixed-signal computing**, enabling real-time, low-power, high-performance processing at the **edge**. They open new possibilities for **in-sensor processing**, **bioinspired systems**, and adaptive **machine learning** in **IoT** and **biomedical systems**, supporting **autonomous systems**, **wearable devices**, and efficient, continuous **data handling**.

This special issue seeks to explore these cutting-edge developments, with specific emphasis on the advancement of **analog** and **mixed-signal computing architectures**, their theoretical advancements, and their application in **resource-constrained environments**. In doing so, the issue aims to address pressing **hardware limitations**, advance **energy-efficient computation**, and encourage breakthroughs in fields such as **cyber-physical systems**, **human-centered computing**, and **edge intelligence**. Through this exploration, we hope to unlock new opportunities for innovations that could transform **autonomous systems**, **wearable devices**, and **biomedical applications**, among others.

Topics of interest

This **special issue** seeks contributions on **circuit** and **system-level innovations** in **analog** and **mixed-signal computing**, targeting **IoT**, **autonomous systems**, **biomedical devices**, **neuromorphic computing**, and **edge computing**. Submissions should bridge **emerging analog**, **mixed-signal**, and **bioinspired computing** with **energy-efficient applications**. Topics of interest include, but are not limited to:

1. Analog and Mixed-signal Computing for Signal Processing

- **Ultra-low-power, real-time analog** computing architectures for high-speed signal processing.
- **Time-domain** and **current-mode processing techniques** for energy-efficient computation.
- **Mixed-signal** approaches for optimized signal transformation and filtering.
- **Adaptive architectures** for next-generation edge sensing and processing.

2. Energy-Efficient Feature Extraction and Predictive Systems

- **Sub-threshold** and **near-threshold analog circuits** for energy-constrained feature extraction.
- **Bioinspired** and **neuromorphic signal processing architectures** for feature extraction.
- **Analog circuits** for **predictive computation** in **edge robotics** and **autonomous systems**.
- **Analog** and **mixed-signal circuits** for **real-time sensor fusion** for IoT and biomedical applications.

3. Neuromorphic and Bioinspired Circuits

- **Spiking neural networks** and **neuro-inspired computing architectures** for low-power applications.
- **Analog** and **mixed-signal neuromorphic circuits** for **event-driven processing** and edge computing.
- **Time-based** and **phase-domain neuromorphic computing** for energy-efficient machine learning.
- **Hardware/software co-design methodologies** for neuromorphic system integration.

4. Memristive and In-Sensor Computing Architectures

- **Memristor-based analog computation** for non-von Neumann and non-memory-specific applications.
- **Crossbar array designs** for **energy-efficient inference** and **neuromorphic** accelerators.
- **Field-programmable analog arrays** and **in-sensor computing architectures** for adaptive hardware.
- **Mixed-signal** and **emerging device-based computing paradigms** for low-power edge applications.

5. Approximate and Stochastic Computing Techniques

- **Ising machines** and **spin-based architectures** for combinatorial optimization.
- **Stochastic computing** techniques for probabilistic machine learning and optimization.
- **Approximate computing** architectures for energy-efficient applications in edge environments.

Submission Procedure

Prospective authors are invited to submit their papers following the instructions provided on the IEEE JETCAS website: https://ieee-cas.org/publication/JETCAS/manuscript-submission-guide. The submitted manuscripts should not have been previously published, nor should they be currently under consideration for publication elsewhere. The IEEE JETCAS submission site is https://ieee.atyponrex.com/journal/jetcas.

Important dates

- Manuscript submissions due: December 08, 2025
- First round of reviews completed: January 26, 2026
- Revised manuscripts due: March 02, 2026
- Second round of reviews completed: March 30, 2026
- Final manuscripts due: April 13, 2026

Request for information

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